



Project “Enhancing capacity of universities to initiate and to participate in clusters development on innovation and sustainability principles” (UniClaD)

Program Erasmus +, projectKA2 n° 609944-EPP-1-2019-1-LT-EPPKA2-CBHE-JP

1 Food Security

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2 Learning outcomes of the whole course

Short description and definition of competences acquired

Food security is a critical component of security at the global, national and personal levels. The evolution of society and the environment makes adjustments to the food security system. If in the past the main threat was natural disasters and unfavorable climatic conditions, military-political events, then in modern conditions the main factors of the food problem are due to economic and socio-cultural reasons. In the modern world, a food system has developed in which the following contradiction remains unresolved: on the one hand, hunger is the cause of the annual death of many millions of people on Earth; on the other hand, global food production today generally corresponds to food needs. In this regard, a necessary condition for preserving human potential and sustainable development is to achieve a stable state of food security for every person, taking into account the physical, economic and social accessibility of food.

The modern understanding of the concept of food security began to take shape in the mid-forties of the 20th century during the Second World War. In 1943, an international conference on food and agriculture was held in Hot Springs (USA), with participants which included representatives of 44 states. At that time, there was a food crisis in many countries, the population was hungry, and the conference participants made it a priority to achieve “freedom from hunger,” which included “a reliable, adequate and adequate food supply for every man, woman and child.” In this context, “reliable” meant ensuring access to food, “adequate” meant the availability of food in sufficient quantities, and “appropriate” meant the necessary nutritional content of food. It was during that period that the main cause of hunger was identified - poverty, which required government agencies to take measures to reduce poverty and create new jobs.

The conceptual basis of food security is influenced by four types of factors: physical, economic, social and temporary determinants. The physical determinant is “availability”, which means the availability of



a sufficient quantity of food of adequate quality, including through own production, supplies from domestic producers and import purchases, food and food reserves. The economic determinant is “affordability,” that is, the availability of sufficient funds to obtain the necessary food and nutrition, which depends on the resources of each individual (household), his income, knowledge, as well as on the level of food prices. The social determinant is “use”, which involves satisfying all the physiological needs of the body with the help of a balanced diet, rational use of food, understanding the rules of health care, food preparation and food storage processes, exclusion of foods harmful to health from the diet, food culture, and commitment to healthy nutrition. The temporary determinant is “stability,” which means sustainable food supply and no risk of loss of access to food in the foreseeable future. There is no doubt about the relationship between food security and adequate nutrition. However, the opinion is often expressed that food security reflects the economic aspect of the problem, and adequate nutrition reflects the biological aspect. The symbiosis of these two components provides an integrated approach to solving food security problems.

As a result of studying the discipline, the student must:

Know: basic knowledge of the fundamental sections of food security to the extent necessary to master the physical, chemical and biological foundations of food security and the agricultural and economic policy of the state;

Be able to: identify and describe types and types of food security violations, evaluate them using modern methods of quantitative information processing;

Possess: methods of chemical analysis, knowledge of modern dynamic processes in nature and the techno sphere, global environmental problems, as well as methods of selection and analysis of geological and biological samples.

3 Overall structure of the course

Title of the units:

- Food security concept. Types of contamination of food raw materials and food products
- Contamination of food products by microorganisms and their metabolites. Pollution with chemical elements. Pollution by substances and compounds used in crop production. Contamination with highly toxic radioactive substances.
- The mechanism of detoxification of xenobiotic and foreign compounds. Food adulteration.

4 Unit description

4.1 Description of Unit 1



<p>Name of the Unit: Food security concept. Types of contamination of food raw materials and food products</p>	<p>Estimated duration for students: 80 minutes (each lecture)</p>
<p>Content:</p> <ul style="list-style-type: none"> • Introduction. • Quality of food products and ensuring its control • ISO terms and concepts • Contamination of food raw materials and food products with xenobiotic of chemical and biological origin • Main ways of contamination of food and food raw materials • Measures of toxicity of substances 	<p>Competences:</p> <p><u>The student is able to:</u></p> <p><i>Understanding of Food Security Principles:</i> The student must understand the basic concepts and principles of food safety, including hazards, risks, and factors affecting food safety.</p> <p><i>Knowledge of Laws and Regulations:</i> The student must have knowledge of key food safety regulations and standards and an understanding of their meaning and application in practice.</p>

Director's plan

Power Point Presentations for each lecture

Assessment / Certificate of Performance

It is planned to organize a quiz exam



4.2 Description of Unit 2

<p>Name of the Unit: Contamination of food products by microorganisms and their metabolites. Pollution with chemical elements. Pollution by substances and compounds used in crop production. Contamination with highly toxic radioactive substances.</p>	<p>Estimated duration for students: 80 minutes (each lecture)</p>
<p>Content:</p> <ul style="list-style-type: none"> • Contamination by microorganisms and their metabolites • Prevention measures • Mycotoxins • Methods for mycotoxin determination and control for food contamination • Pollution with dioxins and polycyclic aromatics hydrocarbons • Polycyclic aromatic hydrocarbons • Radioactive contamination of food raw materials and food products 	<p>Competences: <u>The student is able to:</u></p> <p>The student will be familiar with the various types of microorganisms that can contaminate food, including bacteria, viruses, molds and yeasts, and understand their potential impact on food safety and quality. The student should be aware of the major diseases that can be caused by consumption of contaminated foods, including food poisoning, intoxication, infections and allergic reactions. The student will be familiar with the basic methods of controlling and preventing contamination of food by microorganisms and their metabolites, including hygienic standards, sanitation standards, manufacturing processes, and the use of antimicrobials. The student must be able to apply various methods of analysis and diagnostics to identify microorganisms and their metabolites in food products, including bacteriological and virological methods, molecular genetic methods and chemical analyses.</p>

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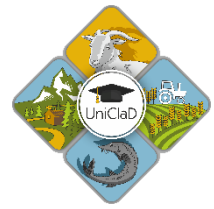
4.3 Description of Unit 3



<p>Name of the Unit: The mechanism of detoxification of xenobiotic and foreign compounds. Food adulteration.</p>	<p>Estimated duration for students: xxx minutes</p>
<p>Content:</p> <ul style="list-style-type: none"> • Metabolism of foreign compounds • Anti-nutritional factors • Types of falsification • Methods of falsification 	<p>Competences:</p> <p>The student is able to:</p> <p>The student must know what xenobiotic are and understand that they are chemical substances not native to the body and usually introduced externally, including industrial chemicals, drugs, pesticides, chemical additives and other substances.</p> <p>Health Effects of Xenobiotic: The student must be aware of the potential effects of xenobiotic on human health and the environment, including toxic, mutagenic, carcinogenic, and reproductive effects.</p> <p>Sources of Xenobiotic in Foods: The student will be familiar with the major sources of xenobiotic in foods, including pesticide and herbicide residues, antibiotics, hormone additives, preservatives, and dyes.</p> <p>Methods of analysis and control of xenobiotic: The student must be familiar with the basic methods of analysis and control of xenobiotic in food products, including chemical, physicochemical and biological methods.</p> <p>Food Adulteration: The student must understand what food adulteration is and know the basic methods and signs of adulteration, including falsification of labeling, substitution of ingredients, dilution of products and other methods of deceiving the consumer.</p> <p>Health Consequences of Adulteration: The student should be aware of the potential health consequences of consuming adulterated foods, including toxic effects, allergic reactions, and other negative effects.</p> <p>Prevention and Control Measures: The student should be familiar with basic methods for the prevention and control of xenobiotic and food adulteration, including the development and implementation of quality and safety systems, testing and inspection, personnel training, and consumer education.</p>



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